

KNOCKDOWN CAGE

BACKGROUND OF THE INVENTION

The present invention relates in general to a cage that can be stored or transported in a collapsed condition but can be quickly assembled for use without the need of screw drivers, 5 wrenches or other hand tools.

Manufacturers of animal cages, such as bird cages, typically sell the cages to wholesalers or retailers in an unassembled condition, since they take up too much space if stored or shipped already assembled. Unfortunately, assembly of one of these "knockdown" type cages can be a time consuming, tedious task requiring the use of hand tools to secure the various cage panels 10 together with a large number of screws, bolts, nuts or other fasteners.

To address the foregoing issue, Applicant devised a folding cage arrangement that is disclosed in Applicant's prior patent, U.S. Patent No. 6,550,424, which issued on April 22, 2003. The disclosed folding cage employs a specially designed hinging system that allows the cage side panels to fold to a collapsed condition for storage or shipping, and to then be unfolded and 15 secured to an open position without the need for any type of fastening means. In addition to the folding side panel assembly, the cage includes removable top and bottom panels or assemblies which, when secured to the folding side panel assembly, maintain the same in an open, unfolded position. The top section is positioned by means of a group of vertical pins extending from the top frame members of the side panel assembly and a plurality of corresponding apertures in the 20 top section. In addition, the bottom frame panel is positioned within a lower horizontal frame section of the unfolded side panel assembly and is held in position by a plurality of L-shaped clips that are permanently attached to the bottom frame panel and have ends that rest on top of the horizontal frame tubes of the side panel assembly. Once the top section and the bottom frame

panel are in position, gravity holds them in place and the side panel assembly is thus secured in its open position, thereby also eliminating the need for any type of latching mechanism.

Although the folding cage disclosed in the '424 patent can be easily assembled, the use of the special hinges and other elements add substantially to the manufacturing costs of the cage.

5 Conventional knockdown cages are less costly, but until now, a need has remained for knockdown cages, which like the patented folding cage, can be readily and quickly assembled with out the use of hand tools and large quantities of fasteners.

SUMMARY OF THE INVENTION

The present invention fulfills the forgoing need through provision of a cage of the knockdown type that incorporates a number of integral fastening elements that facilitate assembly of vertical side panels and top panels of the cage without the use of hand tools. The side panels are assembled to one another using a combination of fastening elements that rely only on the force of gravity to maintain adjacent panels assembled to one another, and do not require assembly and tightening of nuts, washers, bolts or screws, for example. More specifically, first and second of the side panels each have downwardly extending pins that are positioned at opposite bottom corners thereof. These pins are positioned to be received in corresponding apertured plates that extend in a generally horizontal direction from the inside legs of each of an adjacent third and a fourth of the vertical side panels. Pin and keyhole fasteners are also positioned near the top ends of the panels. Preferably, a headed pin, bolt, screw, or the like is permanently affixed to the vertical frame tubing of the first and second panels, each of which engages a corresponding vertical key slot that is cut in the vertical frame tubing of the adjacent third and fourth panels.

This arrangement enables each of the side panels to be secured to one another in the following manner. First, one of the depending pins on the first panel is partially inserted into the corresponding plate aperture on the adjacent third panel. Next, the headed pin near the top of the first panel is inserted into a large top portion of the key slot on the third panel and then the first 5 panel is moved down relative to the third panel, thereby securing both the pin in the aperture and the headed pin in the key slot. It should be noted in this regard that the length of the depending pin is preferably selected to be long enough such that the pin can be partially inserted in the aperture when the headed pin is lined up with the top large portion of the key slot to assist in the panel assembly process.

10 Although the assembled panels will remain secured together as long as the cage is not lifted, U-shaped clips are inserted in parallel vertical slots in the vertical frame tubing of the adjacent panels, which prevent the adjacent panels from moving vertically relative to one another, thereby insuring that the panels will remain assembled even when they are lifted.

The invention also preferably employs a unique arrangement for assembling a top 15 assembly of the cage. In the preferred embodiment, the top assembly is formed in the shape of a half cylinder and includes rectangular base frame, first and second semicircular end panels and first and second curved top panels. Preferably, the first and second end panels are each pivotally attached to opposite ends of the base frame by means of hinges, which allow the panels to be folded down for shipping or storage and folded open for assembly. Each of the curved top panels 20 includes a plurality of tabbed clips spaced along the bottom ends thereof which engage apertured tabs on the base frame. The top ends of the curved top panels engage slotted clip arrangements mounted to the top portions of the first and second end panels. Finally, a plurality of clamping fasteners secure the opposite top ends of the curved top panels to one another through use of

wing nut and screw assemblies that can be tightened by hand. In addition, these assemblies serve a second function of supporting toy or other article hangers inside the top of the cage.

BRIEF DESCRIPTION OF THE DRAWINGS

The features and advantages of the present invention will become apparent from the 5 following detailed description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective illustration of a partially assembled cage constructed in accordance with the preferred embodiment;

FIG. 2 is a perspective illustration of to side panels of the cage ready to being assembled 10 to one another with a unique fastening arrangement in accordance with the preferred embodiment;

FIG. 3 is a partial cut away close up view of the circled area in FIG. 2 showing fastening elements at the bottom portions of the two side panels;

FIGs. 4 and 5 are opposing partial cut away perspective illustrations showing fastening 15 elements near the top portions of two side panels of the cage ready to be assembled to one another;

FIG. 6 is a partial cut away perspective illustration showing the top portions of two side panels of the cage after assembly and ready for reception of a locking clip that is employed to secure the side panels of the cage to one another;

20 FIG. 7 is a partial cut away perspective illustration of the cage showing positioning of another of the locking clips to secure the side panels of the cage to one another;

FIGs. 8 and 9 are partial cut away perspective illustrations showing a portion of the cage top assembly including a base frame and a folding end panel, with FIG. 8 showing the end panel folded down for storage or shipping and FIG. 9 showing the end panel folded up for assembly;

FIG. 10 is an exploded perspective illustration of the cage top assembly showing curved

5 top panels ready for assembly to the base frame and end panels;

FIG. 11 is a partial cut away perspective illustration showing a securing clip arrangement for securing the curved top panels to the base frame of the cage top assembly;

FIG. 12 is a partial cut away perspective illustration showing the cage top assembly including one of the curved top panels shown in position ready for assembly with a securing clip
10 arrangement to the end panel;

FIG. 13 is a partial cut away perspective illustration of the cage top showing an exploded view of fastening hardware employed to secure the curve top panels of the top assembly to one another; and

FIG. 14 is a partial cut away perspective illustration of the cage showing the positioning
15 of another locking clip for securing the cage top assembly to the cage side panel assembly.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

With reference to FIG. 1, a cage 10 is illustrated that is particularly designed for use as a birdcage, but could be used for containing other animals as well. The cage 10 is in some ways similar in design to the folding cage disclosed in the previously discussed U.S. Patent 6,550,424, which is hereby incorporated by reference. However, the cage 10 does not utilize a folding side panel assembly. Instead, the cage 10 includes a side panel assembly 11 in which four side panels are secured to one another using a unique arrangement of fasteners to be discussed in detail in conjunction with FIGs. 2-7. The side panel assembly 11 specifically includes a front panel 12,

left side panel 14, back side panel 16 and right side panel 18. Integrally formed with each of the front and back side panels 12 and 16 are four support legs 20. Like the folding cage design in the ‘424 patent, a bottom frame panel 22 fits within a lower horizontal frame section 24 of the cage side assembly 11 when each of the side panels 12-18 is secured to one another. In addition, a 5 cage floor panel 25 is supported by the side assembly 11 in the same manner set forth in the ‘424 patent.

The cage 10 also includes a domed top assembly 26 that is shaped in the form of a half cylinder and includes first and second semicircular end panels 28 and 30 that are pivotally attached to a rectangular base frame 32. First and second curved top panels 34 and 36 are 10 secured to the end panels 28 and 30 and to the base frame 32 in a unique manner. The details of the top assembly are discussed later in conjunction with FIGs. 8-13.

As is conventional, each of the various panels or sections of the cage 10 is preferably constructed of lengths 40 of rectangular metal tubing which are welded together. Each panel or section also includes one or more groups of spaced cage bars or rods 41.

15 FIG. 2 shows the back panel 16 and the right side panel 18 ready to be assembled to one another using first and second fastening elements 42 and 43. The partial cutaway views of FIGs. 3-7 show the details of the fastening elements 42 and 43. FIG. 3 is a close up view of the circled area in FIG. 2 in which the bottom portion of the right side panel 18 is shown in position to be assembled to the back panel 16. The first fastening element 42 includes a vertical pin 44 that 20 extends downwardly from a bottom corner 45 of a bottom horizontal frame tube 46 of the right side panel 18. An L-shaped plate 48 is attached to one of the vertical legs 20 on the back panel 16. The plate 48 includes a horizontal portion 50 that has an aperture 52 formed therein for reception of the pin 44.

FIGs. 4 and 5 illustrate opposing views of top portions of the front and right side panels 12 and 18, again, just prior to assembly and showing one of the second fastening elements 43. As illustrated, the front panel 12 includes a vertical frame tube 60 which has a vertical key slot 62 cut into a backside 64 thereof. The key slot 62 includes an enlarged portion 66 that receives a 5 headed pin, bolt or screw 68 that is affixed to a front side 70 of a vertical frame tube 72 on the right side panel 18.

It will be understood that although FIGs. 3-5 only show one of each type of fastening elements 42 and 43, there are actually four of each used, one of each at each corner of the cage 10. Thus, each of the front and back side panels 12 and 16 includes two of the key slots 62 and 10 two of the L-shaped apertured plates 48 at opposite ends thereof, while each of the left and right side panels 14 and 18 includes two of the headed pins 68 and two of the vertical pins 44 at opposite ends thereof.

The forgoing arrangement enables each of the cage side panels to be secured to one another in the following manner. First, one of the vertical pins 44 on the left or right side panel 15 14 or 18 is partially inserted into the aperture 52 of the corresponding L-shaped plate 48 plate on the adjacent front or back panel 12 or 16. Next, the headed pin 68 is inserted into the large top portion 66 of the key slot 62 on the adjacent front or back panel 12 or 16 and then the left or right side panel 14 or 18 is moved down relative to the front or back panel 12 or 16, thereby securing 20 both the pin 44 in the aperture 52 and the headed pin 68 in the key slot 62. It should be noted in this regard that the length of the vertical pin 44 is preferably selected to be long enough such that the pin 44 can be partially inserted in the aperture 52 when the headed pin 68 is lined up with the large top portion 66 of the key slot 62 to assist in the panel assembly process.

With reference now to FIGs. 6 and 7, although the assembled panels will remain secure as long as the cage 10 is not lifted, a number of U-shaped locking clips 80 are preferably employed to prevent adjacent ones of the panels 12, 14, 16 and 18 from moving vertically relative to one another. Each of the clips 80 includes a pair of parallel legs 82, each of which fits into a corresponding one of first and second parallel vertical slots 84 that are formed in the vertical tubes 40 of the adjacent panels. As illustrated, the legs 82 are shaped such that the force of gravity will urge the legs 82 into locking engagement with the corresponding slots 84. FIGs. 6 and 7 show two different preferred locations for the locking clips 80. Preferably, two of the clips are employed to secure each pair of adjacent ones of side panels 12, 14, 16 and 18.

Returning once again to FIGs. 4-6, each of these shows one of four vertical pins 86 that are employed to positioning the top assembly 26 on the cage side assembly 11 in the same manner as is disclosed in the '424 patent in which the pins are received in corresponding apertures (not shown) in the underside of the top assembly 26.

The present invention also preferably employs a unique arrangement for assembling the top assembly 26 of the cage 10 as illustrated in FIGs. 8-14. In the preferred embodiment, the first and second semicircular end panels 28 and 30 are each attached to opposite ends of the base frame 32 by means of a pair of hinges 90 as illustrated in FIG. 9 which allow the end panels 28 and 30 to be folded down for shipping or storage as illustrated in FIG. 8 and folded open for assembly as illustrated in FIG. 9.

As illustrated in FIGs. 10 and 11, the assembly of the curved top panels 34 and 36 to the base frame 32 begins by inserting each of a plurality of tabbed brackets 92 that are spaced along bottom ends 94 of the panels 34 and 36 into a corresponding one of a plurality of slotted tabs 96 that are attached to the base frame 32. Next, as illustrated in FIG. 12, the top ends of the curved

top panels 34 and 36, each of which include a horizontal frame tube 98 and 100, respectively, are inserted into first and second U-shaped clips 102 (one shown) that are attached, one each, to the top of the first and second end panels 28 and 30. Each of the clips 102 includes a downwardly extending T-shaped tab 104 having first and second horizontal extensions 106 (see also FIG. 9) 5 at the lower end thereof. Each of the horizontal frame tubes 98 and 100 includes a vertical slot 108 that receives a corresponding one of the tab extensions 106. When the curved top panels 34 and 36 are inserted into the U-shaped clips 32, the inherent dimensional tolerances in the panels 34 and 36 cause them to apply upward pressure on the U-shaped clips 32 which, in combination with the tab extensions 106 in the slots 108, insure a secure connection of the panels 34 and 36 to 10 the rest of the elements of the top assembly 11.

With reference now to FIG. 13, a pair of clamping fasteners 110 is employed to secure the opposite top ends of the curved top panels 34 and 36 to one another. Each of the clamping fasteners 110 includes a combination screw/clamping plate/toy hanger 112, a second clamping plate 114 and a wing nut 116, which can be tightened by hand. In addition to providing a 15 securing function, these assemblies thus serve a second function of supporting the pair of toy hangers inside the top of the cage 10.

Finally, FIG. 14 shows the use of yet another one of the locking clips 80 to secure the cage top assembly 26 to the side assembly 11 by inserting the clip 80 in a pair of horizontal slots 120, one in the top assembly base frame 32 and the other in a top frame tube 122 of the right side 20 panel 18. Although the top assembly 26 is heavy enough to stay in position on the side assembly by means of gravity, the use of the locking clips 80 is preferred to insure that the assemblies do not separate during moving of the assembled cage or in the event that the cage 10 is accidentally knocked over. Preferably, two of the clips 80 are employed, one at each end of the cage 10.

Thus, a total of ten of the clips 80 are employed in the assembly of the cage, four at each end to secure the side panels to each other and one at each end to secure the top and side assemblies.

In conclusion, the present invention provides an inexpensive knockdown cage construction that facilitates easy assembly with no tools required, yet allows the cage to be 5 collapsed for storage or shipping. In addition, once assembled, the cage is sturdy in spite of the fact that no fasteners are used in its assembly that require more than hand tightening.

Although the present invention has been disclosed in terms of a preferred embodiment and variations thereon, it will be understood that numerous additional modifications and variations could be made thereto without departing from the scope of the invention as defined by 10 the following claims. For example, although the preferred embodiment combines the unique features of the side and top assemblies, it should be understood that each of the assemblies is unique in and of itself. Thus, for example, the top assembly could be used with the folding cage disclosed in the '424 patent, while the side assembly could be used with top assemblies of conventional or other construction.